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February 27, 1958

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Dear Sir:

Thank you for your letter of 13 February 1958 covering "ADDITIONAL RECORDER SPECIFICATIONS". In view of the unacceptance of my original quotation which was hand carried to Washington, and further in view of the additional changes in specifications that have been made subsequent to the submission of the original quotation, we wish to cancel our entire quotation as submitted.

We now are pleased to furnish a new quotation covering the changes and are confident that we can meet the additional specifications even though additional time will be required.

I have had an opportunity to go over the specifications in detail with one of your technical representatives and believe there are no unexplained specifications or chance of misunderstanding on any of the items.

To assist in analyzing the three recorders involved, I will discuss the units separately.

SPECIFICATION NO. 1PORTABLE TAPE RECORDER/REPRODUCERCROSS TALK

One of the additional specifications covers cross talk between tracks. We will produce a multi-track head with full shielding between head and track members which will offer us a cross talk figure down 40 DB or more at all frequencies between 250 cycles per second and 60,000 cycles per second.

POWER INPUT

We appreciate the desirability of a maximum current consumption of 3 amperes. This specification is not defined as to what the primary voltage is. The specification states exactly 6 volts which is normally higher from either lead acid or nickel cadmium batteries. The fully

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charged lead acid battery would be around 7 volts or more and the nickel cadmium voltage would be somewhat over 6 volts. Depending upon the method of regulation used, the current consumption will vary with this voltage.

DRIVE SYSTEM

It is our objective to furnish a method of speed control which will have the following features:

- (1) A stable power source to hold constant motor speed.
- (2) A tape drive assembly to produce a tape motion with a flutter and wow content not to exceed .5% peak to peak and obviously, a much lesser reading than this, if possible. We would anticipate a peak to peak reading in the order of 0.2 to 0.3% peak to peak.
- (3) We would provide a power and motor system that would produce the minimum amount of radiated, induced and conducted noise. The most efficient drive system is generally obtained by a DC motor using a permanent magnet field and a centrifugal governor interrupting the armature current. Such a system creates broad band noise which is most difficult to filter and shield. A DC motor of this nature has some mechanical losses because of the brush tension against the commutator and mechanical losses in the regulator. For years we have studied and produced prototypes of AC powered motors controlled by regulated frequency sources. Such a motor has no mechanical drag and there are no moving contacts, interrupters or anything that can produce "hash". We are limited in the efficiency of such an AC motor as compared to the DC motor but we gain by the lack of mechanical losses. While it is our design objective to draw considerably less than the specified 18 watts, we may ask that the specification on this power consumption be increased if we prove beyond a reasonable doubt that we cannot successfully operate the AC system at 18 watts. This information would be available within the first 30 days of the contract. The systems that we have produced in the past have been in the 7-1/2 and 15" tape speed range, whereas 30" per second requires a greater amount of power. Experience has taught us that we can design and produce the drive system in the less than 25 watt consumption range for the 30" per second.

We may weigh an R/C frequency generator system in place of the tuning fork control in view of the driving force required for the fork. While this is an item of only a few watts, it is still to be considered. We may elect to use a quartz crystal, operating at some low frequency and divide down to a lower frequency using semi-conductors to achieve this frequency division. In other words, we

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will meet the specification of one part in 2000 by a mechanical means, electronic means, or an electro-mechanical means, whichever is most efficient.

(4) Our observations of equipment furnished for self-contained DC drive frequently works marginally well as a laboratory unit but becomes a maintenance problem in the field. The design objective of anything we produce will be to have the fewest number of moving parts or components subject to wear so that maintenance is absolutely minimized. The drive systems that we have suggested meet this requirement.

SPECIFICATION NO. 2PORTABLE TAPE RECORDER/REPRODUCER

We feel that the material covered under Specification No. 1 concerning the drive motor and drive system should also be applicable to Requirement No. 2. In other words, it would certainly be in our mutual interests to have the drive systems compatible between the units.

HOUSING OR CASE

We will make up drawings within 45 days from receipt of contract showing a recommended housing and method of its construction which will be submitted to your activity for approval. From these drawings we will then have a magnesium or aluminum case fabricated.

SPECIFICATION NO. 3PORTABLE TAPE RECORDER/REPRODUCER

Again, we will endeavor to provide the same motor system and control as used in Specifications No. 1 and Specifications No. 2.

Our mechanical construction of all three units will employ the best of precision bearings and other mechanical components which will not be affected by the temperature ranges specified.

Electronically, we shall use the best commercially available components to meet these temperature ranges and not adversely affect the amplifier operation. Fortunately, semi-conductors are now available which operate far beyond the limits specified.

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In establishing a price covering these three units, we have calculated the man hours of five of the Department Heads who would be charged with the fabrication of components from their departments. The five types of components are as follows:

1. Electronic
2. Mechanical
3. Motor
4. Magnetic Heads
5. Semi-Conductor Motor Control Circuitry

We are listing their man hours under Direct Manufacturing Labor "Pre-Production". Under Production, we are including the technicians who accomplish the final assembly. Obviously, in a case of a custom recorder, it is not possible to realize a "production figure" on a one-at-a-time basis.

The year-end figures of our Corporation are now completed and we have established a burden for Direct Labor and a G & A figure which permits us to offer this fixed price quotation.

The total price of \$46,251.38 to cover design, fabrication and delivery FOB Washington, D.C. area of the three recorders is predicated on the data in our cost analysis. Most of this information is self-explanatory and is based upon realistic data. A brief description of some of the items under their headings is as follows:

(1) Direct material - the purchase price will include all hardware, special semi-conductors, tuning forks, and general electronic components necessary in the 18 amplifiers that are included. The sub-contracted items cover special grinding and dynamic balancing necessary for successful execution of the contract.

(7) Since modern shipment seems to be extremely hazardous, it has been recommended that we ship the material in drums with suitable isolation packing material to insure safe transport.

(19) While most of the design of our equipment is covered by our own patents as well as patents of Western Electric, and A T & T, we also have a license agreement with the Armour Institute of Technology in Chicago. This requires a maximum royalty of \$10.00 for each recorder we produce.

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It is our understanding that whether or not they have any valid patents or whether the end product is for the Government, they do not respect such conditions and the royalty is binding and irrevocable.

In analyzing the unique and special features of the three recorders, it would be less expensive and would take very little more time to produce the three units as a package rather than to attempt to price each one out individually and accept a contract to build just one unit. Roughly estimating, the cost of a single unit would come out only 10 or 15% less than obtaining all three units. We have accordingly submitted our cost analysis based on the fact that there would be three units in the package - the motor and control systems that we would produce to be essentially the same in all three units.

In view of certain requirements that are now included in the specifications, delivery of the three units will be completed in four months. It is possible that the unit covered by Specification No. 1 can be shipped prior to this time and every effort will be expended to realize this possibility.

The only exceptions that we take to your specifications will be the drive system drain as already set forth and the possibility of meeting the specifications of the frequency response. The recorded material will be reproduced on government equipment and consequently, the performance is predicated on the capability of this equipment. We desire that we be furnished a standard frequency tape indicating the performance of the government owned equipment. If the equalization curve of the government equipment permits us to attain 60 KC response, we shall do so. We would not have difficulty in recording and reproducing this response within the equipment that we furnish, but our curve must be compatible with the curves that you are now using. The playback facilities that we provide are basically for monitoring and checking purposes.

We are very pleased to have the opportunity to bid on these proposals and our only reason for undertaking this project is to demonstrate our abilities and facilities. We, therefore, hope we are given an opportunity and feel confident that we can meet and surpass the specifications in all instances.

Cordially yours,

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President

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DEPARTMENT OF DEFENSE COST AND PRICE ANALYSIS		NOTE: If your cost accounting system does not permit analysis of costs as suggested below, contact the purchasing office for further instructions.		Form Approved Budget Bureau No. 22-R100	
NAME OF OFFEROR		CONFIDENTIAL		PREVIOUS CONTRACT FOR SIMILAR MATERIAL	
HOME OFFICE ADDRESS				CONTRACT NUMBER None	
DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED As above		QUANTITY		ACTUAL MANUFACTURING PERIOD (Exclusive PreProduction)	
SUPPLIES AND/OR SERVICES TO BE FURNISHED Design and Fabrication of Special Recording Equipment		FROM		TO	
QUANTITY 3	AMOUNT OF PROPOSAL \$46,251.38	PROCUREMENT DIRECTIVE NUMBER		PEAK RATE PER MONTH	
ITEMS (Excluding Tooling) <i>a/</i>		PROPOSED CONTRACT ESTIMATE			PREVIOUS CONTRACT ACTUAL UNIT COST <i>d/</i> <i>e/</i>
		PREPRODUCTION	PRODUCTION	TOTAL	
1. DIRECT MATERIAL:					
PURCHASED PARTS <i>b/</i>		400.00	\$ 1,850.00	\$ 2,250.00	-0-
SUBCONTRACTED ITEMS <i>b/</i>		-0-	500.00	500.00	-0-
OTHER <i>c/</i>		-0-	-0-	-0-	-0-
2. ENGINEERING LABOR:					
HOURS PREPRODUCTION	PRODUCTION				
3. ENGINEERING BURDEN % OF 2					
4. DIRECT MANUFACTURING LABOR:					
HOURS PREPRODUCTION	PRODUCTION				
1,750	3,500	6,750.00	7,450.00	14,200.00	-0-
5. MANUFACTURING BURDEN 125% OF 4		8,437.50	9,312.50	17,750.00	-0-
6. OTHER DIRECT COSTS: <i>i/</i>					
7. Special Packaging			250.00	250.00	
8.					
9.					
10. OTHER INDIRECT COSTS: <i>j/</i>					
11.					
12.					
13.					
14. SUB-TOTALS		15,587.50	19,362.50	34,950.00	
15. SELLING EXPENSES					
16. GENERAL & ADMINISTRATIVE EXPENSES		2,338.12	2,904.38	5,242.50	
17. SUB-TOTALS		17,925.62	22,266.88	40,192.50	
18. PROFIT		2,668.84	3,340.04	6,028.88	
19. ROYALTIES <i>o/</i>			30.00	30.00	
20. CONTINGENCIES <i>p/</i>					
21.					
22. FEDERAL MANUFACTURERS' OR RE-TAILERS' EXCISE TAX <i>h/</i>					
23. UNIT SELLING PRICE OR TOTAL CONTRACT PRICE EXCLUDING TOOLING <i>l/</i>		20,614.46	25,636.92	46,251.38	
24. SPECIAL TOOLING COST FROM REVERSE SIDE OF FORM					
25. UNIT SELLING PRICE INCLUDING SPECIAL TOOLING <i>l/</i>					

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ANALYSIS OF TOTAL ESTIMATED COST OF SPECIAL TOOLING		FOOTNOTES
COST ELEMENTS	ESTIMATED COST	<i>a/</i> Furnish in space at left separate analysis for total cost of special tooling. <i>b/</i> Definitions are shown on DD Form 347 referenced in ASPR paragraph 7-105.7, Bill of Materials. Attach list of principal parts and items indicating source and unit price. <i>c/</i> Ordinarily includes (1) basic commodities and raw materials acquired by a contractor in a form or state which requires further processing and (2) other general usage materials which are procured or manufactured for usage in the normal course of contractor's business. Describe method of costing (2). <i>d/</i> For research and development and other projects under which it is impracticable to show unit prices, the data should be presented on a total contract price basis. <i>e/</i> Furnish patent numbers, names of licensors and rate and basis of royalties. <i>f/</i> Exclude any preproduction or other non-recurring costs. If previous contract is not completed, use best estimate. <i>g/</i> Explain fully, attaching list of items and amounts. <i>h/</i> Selling price must include any applicable excise tax on finished articles. <i>i/</i> Price is F.O.B. ☐ origin or ☒ destination. the latter, indicate transportation cost \$ _____ <i>j/</i> Should include, for example, such things as: 1. "Packaging and Packing", if special to the contract, of significant dollar value, or separately accounted for. As alternate procedure, use a supporting schedule. 2. "Material Handling", if separately accounted for.
1. DIRECT MATERIAL:		
PURCHASED PARTS <i>b/</i>		
SUBCONTRACTED ITEMS <i>b/</i>		
OTHER <i>c/</i>		
2. DIRECT MFG LABOR	HOURS	
3. BURDEN	% OF 2	
4. DIRECT ENG LABOR	HOURS	
5. BURDEN	% OF 4	
6. OTHER FACTORS: <i>j/</i>		
7.		
8.		
9. TOTAL ESTIMATED COST		
10. AVERAGE COST PER UNIT		

1. Is the estimate for direct labor based on wage rates currently prevailing in your plant? ☒ Yes ☐ No
(If not explain difference on a separate sheet)

2. What monthly rate of production is contemplated in calculating your price proposal? 1 units How many hours of operation required per week? 40

3. If currently producing the same or similar items, what monthly rate of production prevails? _____ units How many hours of operation required per week? _____

4a. Explain method of computing any depreciation charge included in your proposal.

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b. Have you included any charge for fully depreciated facilities or equipment? ☐ Yes ☒ No (If yes, explain)

5. The Company, Corporation, or Firm submitting this analysis represents that; (A) The prices shown on this form do not include any charge for (I) cost of facilities (including tools, jigs, dies, and other equipment) which duplicates any charge against any other prior or current Government contract or subcontract. (II) any depreciation on facilities or equipment owned by the Government or any Government agency. (III) any rental or use charge on facilities or equipment owned by the Government, or any Government agency if such facilities or equipment have been provided free of charge;
(B) The prices shown on this form are based on the understanding that the following material, or services, will be furnished by the Government:

(C) It does not require any Government financial assistance;

(D) Bases used in computation of burden rates do not include allowance for overtime compensation;

(E) The bidder (contractor) represents: (a) that he ☐ has, ☒ has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the bidder (contractor)) to solicit or secure this contract and (b) that he ☐ has ☒ has not, paid or agreed to pay to any company or person (other than a full-time bona fide employee working solely for the bidder (contractor)) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract; and agrees to furnish information relating thereto as requested by the contracting office.

(F) The prices shown do not include any cost of acquisition of facilities.

ANY EXCEPTIONS TO ITEM 5 SHOULD BE FULLY EXPLAINED ON SEPARATE SHEETS.

CERTIFICATION - THIS IS TO CERTIFY THAT THE INFORMATION CONTAINED IN THIS PROPOSAL HAS BEEN BASED UPON OR COMPILED FROM THE BOOKS AND RECORDS OF THIS COMPANY AND IS ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

DATE 27 February 1958	FIRM NAME
TITLE President	BY